

PSYCHE.

A FAUNAL AND FLORAL TABULATION-SCHEME.

BY ALBERT P. MORSE, WELLESLEY, MASS.

IN olden times learned cartographers drew at the king's command charts of the world as they imagined it to be, and placed thereon quaint representations of the strange creatures of their dreams or of legendary folk-lore handed down from who knows what horizon — dark hints, it may be, of the reptilian age, transmitted through the quivering nerves of fear. When some adventurous savage, wandering in a remote ravine of the unpenetrated fastnesses, first gazed upon the uncouth remains of gigantic monsters of the past emerging from the cliffs, who shall depict his amazement, his unfathomable awe, his naked terror? Who would not dream with him that in the far recesses of that weird land fierce shapes might yet be lurking? Does not the sea-serpent still survive?

Upon those charts mythical creatures flourished; leviathan sported here, behemoth ravened there, dragons of the prime uncoiled their scaly lengths in caverns of the under-world, valkyrs and furies peopled the atmosphere. Later, with increasing travel and observation, these delineations came to present more and more resemblance to the actual realities. Polar bears and elephants, walruses and camelopards, replacing the earlier monsters, frisked amid ice-floes, reveled in the jungle, or galloped over the wide karroo.

Pictures gave place to names of the beasts, strewn across the continents with a careless freedom exceeded only by that of the almanac weather-prophet whose "Signs of a storm" or "Grows milder with occasional showers and sometimes snow" scattered down the page contributes to the gayety of the rural mind.

At length the outline map appeared, tinted over the area known or supposed to be inhabited by a species, an indispensable adjunct to scientific study of the subject. Maps of this kind, illustrating the horizontal or surficial distribution, in regions of simple topography and when drawn on a sufficiently large scale, may represent the zonal distribution as well. But in mountainous regions and areas of complex topography a scale necessary to represent adequately the zonal distribution would often be impracticably large. It is for this purpose, and to facilitate by tabulation the study of faunal components, that I have devised the scheme here described.

The idea underlying it is this: — a combination of zonal and topographical features in a diagram in such manner as to present both the zonal and the approximate geographic distribution of the fauna or flora of a given territory, either past or present, in a graphic way, thereby facilitating the study of both kinds of distribution and the tabulation of results. Diagrams will differ according to the factors involved, — life-zones, societies, etc., on the one hand, and topographic regions, features, etc., on the other, but the plan is capable of wide application. The diagram here shown is designed with especial reference to the United States and Canada.

The seven life-zones (following Merriam) are arranged in a vertical series beginning with the Tropical at the bottom and ascending through the Lower and Upper Austral, Transition, Canadian, and Hudsonian, to the Arctic-Alpine. The meridional extent of the country is divided into an east and west series of regions, ten in number, based on the more salient features of topography, and named, beginning with the easternmost: — Atlantic, Appalachian, East Central, West Central, Plains, Cordilleran, Basin, Sierran, Californian, and Pacific. Each wider region is represented in the diagram by a column made up of a square area in each zone; each narrower region by a narrower column one-half or two-thirds as wide as the former. The tropical zone, being restricted to areas of inconsiderable size in three widely separated regions, — Florida, Texas, and Arizona, — is represented by small squares attached to the Lower Austral zone at the proper points. Subdivisions are indicated in the case of the Gulf strip and Austro-riparian sections of the Lower Austral, and the arid western and humid eastern divisions are separated by a double line.

But little attention relatively has been paid to the zonal distribution of particular groups of insects over a broad extent of country and there is a wide field for records in this line. Desiring to test the practical working and value of this scheme in relation to a group of animals whose zonal distribution has been carefully studied, I have applied it, at the suggestion of Mr. Glover M. Allen of the Boston Society of Natural History, to the genus *Neotoma*,¹ using for comparison a series of tinted maps, with excellent results.

In practical use the diagram is treated like the outline map, a copy being used for each species or variety, and the presence of a species in a given zonal area is indicated by a cross, dash, or other convenient and rapidly made mark (or tint if preferred), the totality of these marks indicating the *zonal distribution* and the *approximate geographical position as well*. This graphic element is believed to be a most valuable feature of this scheme, aiding greatly in the preparation of the

¹ See Dr. Merriam's paper in Proc. acad. nat. sci. Phila., 1894.

slips and in quick apprehension of the results. One has but to make trial of the scheme to be convinced. In tabulating, the slips may be quickly arranged and re-arranged as often and in as many ways as is desired for the purpose of securing facts or of testing hypotheses.

In case but few species are involved a suggestive method is to prepare the diagram on a sufficiently large scale and to place in each area the names of the species and varieties inhabiting it, noting how their distribution agrees with their systematic relationships. If the species are too numerous for names to be used, check-list numbers may be substituted, in different colors for different groups of species.

A more detailed statement of the distribution may be secured by dividing each square area into nine sub-areas (see diagram) and indicating these respectively, according to points of the compass, as central (C), north-central (NC), northeast (NE), east-central (EC), etc., parts of the area; N, E, S, and W indicating the series of three sub-areas in those portions of each area, MC for the meridian central or median series and ZC for the parallel or zonal central series. If preferred for the sake of brevity, instead of letters, these sub-areas could be indicated by numbers (arranged vertically, so that sub-areas bearing the same number would have the same relative position in wide and narrow areas).

nw	ne	nw	n	ne	1	4	7	w		mc		c	n
wc	ec	wc	c	ec	2	5	8						zc
sw	se	sw	s	se	3	6	9						s

A further step would be the use of abbreviations or other symbols for the zones and regions, enabling the distribution to be expressed by formulae:—thus the zones may be indicated by Roman numerals, I to VII, upward from the Tropical; and the regions by A, B, C, etc., (perhaps omitting I, owing to its use for the tropical zone), beginning on the Atlantic side, or the Pacific, as seemed preferable. Thus the distribution of a species known only from the upper Austral zone of eastern Nebraska would be represented by III G 5 (or III G c). The use of numerals would be preferable for brevity, letters would aid the memory. In the narrower areas, having their greatest extent from north to south, an east and west division into but two series of six sub-areas would probably be preferable to one of three series of nine. This sub-division could be carried to a much greater extent if found advisable.

Let us glance at another possibility. Suppose it were desired to make a study of the distribution of the 11,000 beetles of North America, or, indeed, of the entire fauna and flora of the country, with details of distribution of each of its component groups:—by using punched cards (instead of marked or tinted slips) in an auto-

matic tabulating machine the utmost accuracy and despatch could readily be secured.

Copies of the diagram as given in the accompanying plate will be furnished at cost, per 100 or more, to any one desiring to use them. Should the demand warrant so doing, arrangements will be made for its use with a tabulating machine.

THE ORDERS OF INSECTS, BY A. E. SHIPLEY, *Zoologischer Anzeiger*, XXVII, 259.— The author has made several changes and suggests seven new names, which “if adopted would give an uniform termination to all the twenty-two Orders which are now recognized in the class Insecta.” The new classification is as follows:—

	Name suggested.	Old name.
Apterygota	{ 1. Aptera	Thysanura
	{ 2. Apontoptera, new name.	Collembola
Anapterygota	{ 3. Lipoptera, new name.	Mallophaga
	{ 4. Ellipoptera, new name.	Anoplura
	{ 5. Aphaniptera	Siphonaptera
Exopterygota	{ 6. Orthoptera	Orthoptera
	{ 7. Plecoptera	Perlidae
	{ 8. Psocoptera, new name.	Psocidae
	{ 9. Isoptera	Termitidae
	{ 10. Embioptera, new name.	Embiidae
	{ 11. Ephemeroptera, new name.	Ephemeridae
	{ 12. Paraneuroptera, new name.	Odonata
	{ 13. Thysanoptera	Thysanoptera
	{ 14. Hemiptera	Hemiptera
Endopterygota	{ 15. Neuroptera	Neuroptera
	{ 16. Mecaptera	Panorpatae
	{ 17. Trichoptera	Trichoptera
	{ 18. Lepidoptera	Lepidoptera
	{ 19. Coleoptera	Coleoptera
	{ 20. Strepsiptera	Strepsiptera
	{ 21. Diptera	Diptera
	{ 22. Hymenoptera	Hymenoptera